

EARTHQUAKES

Hokkaido damage slight

Japanese authorities estimate damage to buildings and industrial structures from last month's earthquake will total more than \$200 million. The Hokkaido prefectural government's preliminary estimate of \$196.8 million does not include damage to roads or utility lines. Hokkaido Japanese Railways Co. separately reported damages of more than \$8 million. The earthquake killed two people and injured more than 600.

Japan's Meteorological Agency, after reviewing data from all observation points, revised its assessment of the tremor's strength to 7.8 on the Richter scale from the previously announced magnitude of 7.5.

The epicenter of the quake—and most of the damage—was in the Pacific Ocean about 18 miles south of Kushiro, a fishing port on the east coast of Hokkaido about 550 miles northeast of Tokyo. The agency also placed the depth of the focus of the earthquake 6.4 miles below the seabed.

According to surveys by prefectural authorities, over 1,100 buildings sustained some damage, although in many cases it was superficial cracking of facades and broken windows. "Considering the strength of the earthquake,

damage was very light," says Yuji Ishiyama, professor of structural engineering at Hokkaido University, Sapporo.

Ishiyama, who toured the area shortly after the quake, said that where building damage was substantial, it was typically because of ground failures. Residences throughout the area are low-rise wood-framed buildings without the heavy tile roofs and large window openings more common in residential construction elsewhere in Japan.

Footings in Hokkaido houses are normally set to a frost depth of 3.2 ft, deeper than in more southerly areas of Japan. Experts believe this may have added earthquake resistance.

Ishiyama says more damage was caused by mechanical equipment insufficiently secured to buildings or foundations. He also says liquefaction popped manhole frames out of the ground and slope failures damaged roads and railroads throughout eastern Hokkaido.

According to the Hokkaido prefectural office in Sapporo, utility service was restored to all but a handful of customers within a few days. Service suspended on two damaged rail lines immediately after the temblor resumed after two weeks. ■

SOLID WASTE

River washes out landfill

No one likes cleaning up garbage, especially the flotsam now swirling through metropolitan Phoenix, where floodwaters last month washed away part of a suburban landfill into the normally dry Salt River. The landfill, located east of the city on the river bank, is outside of the authority of environmental regulatory agencies because it is owned by the Salt River Pima-Maricopa Indian Community.

Who pays for the clean-up? "That's a good question," says tribal President Ivan W. Makil. The Federal Emergency Management Agency plans to divvy up responsibility among various parties soon.

Arizona officials claim that 139,000 cu yd of refuse washed into the river when floodwaters eroded an 800-ft-long



River bank erosion led to landfill degradation.

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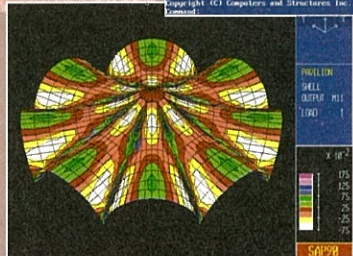
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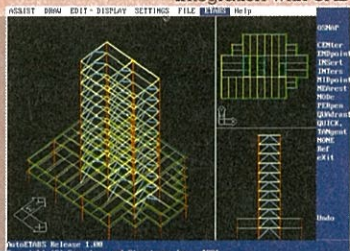
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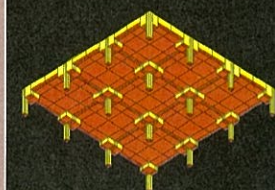
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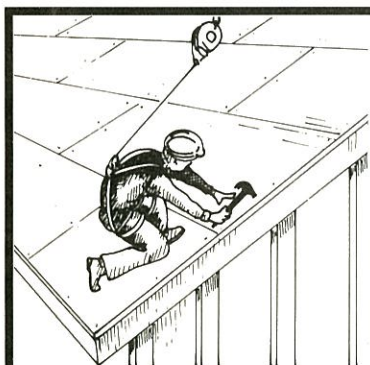
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berm protecting Tri-City Landfill. Tribal officials say only 14,000 cu yd of material washed away, not counting gain from illegal dumpsites and picnic areas upstream.

Tri-City's troubles date back to the winter of 1979-80, when a protective dike failed. Then, a year ago during winter storms, the Army Corps of Engineers oversaw the tribe's emergency placement of rock along the bank to withstand an immediate flood threat of 14,000 cfs. That bank, built of blasted rock, failed Jan. 8-11 under flows of more than 80,000 cfs.

"It was an emergency action," says Sam A. Arrowood, a Corps engineer in Phoenix.

By the end of January, the tribe spent nearly \$2 million building a new temporary dike. Ultimately, the tribe wants the Corps' permission to build a concrete dike at an estimated cost of \$3.9 million, and to channelize that reach of the river with soil-cement.

Environmentalists want the landfill closed immediately. For now, according to a Jan. 26 ruling in U.S. District Court in Phoenix, the tribe must fence off the landfill with woven filter fabric, and keep it outside the 100-year flood plain.

The City of Mesa is the only municipal user of the unlined 400-acre landfill. Tempe quit using the facility last year, and Scottsdale pulled out last month after the filing of a lawsuit by environmentalists. The tribe plans to close the dump by next October, when the U.S. Environmental Protection Agency implements new regulations under the Resource Conservation and Recovery Act. Tribal officials, who note the landfill is near capacity, say they have been in compliance with all federal environmental regulations. ■

HANGARS

Tijuana airport to sport a three-plane shed

A \$60-million maintenance hangar under construction at Abelardo L. Rodriguez International Airport in Tijuana, Mexico, with 150,000 sq ft of column-free area, will boast Mexico's largest clear-span space, according to project officials.

When it's finished in the fall, the shed will be able to cover three jumbo jets, says Thomas P. Riley, vice president for international operations for the project's construction manager, Birtcher Construction Ltd., Costa Mesa, Calif. Because the airport is located on top of